

(23)

**PROTEST AGAINST LEASING OF PARCELS EAST OF THE CONTINENTAL DIVIDE  
IN THE WATERSHEDS OF RIO ARRIBA AND SANDOVAL COUNTIES  
FOR OIL AND GAS WELL EXPLORATION AND DEVELOPMENT AS  
PROPOSED BY THE BUREAU OF LAND MANAGEMENT  
FOR PARCELS DEFERRED AND REMAINING IN ITS  
PROPOSED LEASE SALE OF OCTOBER 22, 2014**

**(EA Log Number: DOI-BLM-NM-F010-2014-0154-EA)**

**A Protest By An Individual and President of VitaleTherapeutics, Inc.**

**A 501(c)3 Health Research and Educational Organization**

**Galen D. Knight, Ph.D., Resident**

**Rio Arriba County**

**PO Box 619**

**Canjilon, NM 87515**

**Telephone: 575-684-0148**

**To All Concerned Citizens of New Mexico, Texas, Mexico, and To The Special:**

**Attn: Jesse Juen**

**New Mexico BLM State Director**

**U.S. Bureau of Land Management**

**301 Dinosaur Trail**

**PO Box 27155**

**Santa Fe, NM 87502**

**INTEREST:**

My interest in this matter stems from nearly 40 years of health research and education during which time I studied and developed a working understanding of biology (B.S.) and chemistry (B.S. And "pH'd"), physics including nuclear physics used in research to study my primary interests in biochemistry, ecology, nutrition, physiology, immunology, endocrinology, and toxicology, the last area of interest causing me (upon learning about the BLM's proposed lease to develop and produce oil and gas from beneath Cebolla, NM) to stop what I was doing in other arenas of health research and education and focus upon this and other oil and gas exploration and development issues in the Rios Gallina, Puerco (both), and Chama Watersheds (Herein "Watersheds" unless separately noted). Upon familiarizing myself with the extensive scientific literature about these Watersheds, including weather, seismology, hydrology, tectonics, and surface and subsurface geologies, it became obvious that these Watersheds and their respective groundwaters are tributaries to the Rio Grande and subject to applicable County, State, Federal, Interstate, and International compact, treaty, laws and regulations. My initial discomfort with the misrepresentations of a BLM geologist and later a high-ranking official of the Farmington Field Office, itself, have only fueled my concerns about the health and well-being of Rio Arriba County Citizens and those downstream, including my daughters

living in Albuquerque. I had previously deduced, studied, and determined the biochemical pathways poisoned by the many types of substances found to result in metabolic imbalances, disruption of hormonal homeostasis, neurological symptoms and neurodegenerative disease, and even diseases and death from among the leading causes, including heart disease, cancer, diabetes, and even properly prescribed medicine. Literally unnervingly, these documented toxic, carcinogenic, and even radioactive health hazards can be predictably explained as causative, and unfortunately are being admittedly added to hydraulic fracturing (sic., "fracking") fluids, are showing up all too frequently in "proprietary" fracking fluids concealed under the "Energy Policy Act of 2005" and when used, produced these and even more toxic, carcinogenic and radioactive materials in the flowback and produced waters. It became obvious to me that in order to maintain and improve the health of people, wildlife, livestock, poultry, forests, entire ecosystems, and the planet itself, especially with Fukushima spewing vast amounts of radiation and toxins into our environment, this apparent poisoning and insult to at least the health and well-being of the Citizens of Rio Arriba and Sandoval Counties, and to those downstream from these Watersheds in New Mexico, need to be addressed with facts and scientific evidence devoid of financial influence, predetermination, and prejudice.

## **STATEMENT OF REASONS**

This protest addresses with scientific facts, and with logical deductions and interpretations therefrom (at least to me), much of the misleading evidence and misinformation provided by the BLM in its Environmental Assessment (EA) and unsigned Findings of No Significant Impact (FONSI), and in its public scoping meetings and in the public media. A FONSI for the October 22, 2014, Oil and Gas Lease Sale is not supported by the Environmental Assessment in its current form, even with additional information provided in its 2003 Farmington RMP, its 2002 Biological Assessment, the FEIS for OIL and Gas Leasing and Roads Management from the Santa Fe National Forest, nor is it supported with additional information from BLM's now obsolete and antiquated 2001, 20-year Reasonable Foreseeable Development (RFD).

BLM appears bent upon continuing to lease for exploration and development into the surface Mancos Shale, even though this has been identified as a seasonal source of drinking water in the Chama Platform and its Watersheds, and even though the surface Mancos Shale dominating much of the Chama Platform Watershed was outside the BLM's RFD Principal Study Area. The remaining parcels in the BLM's lease proposal in the Santa Fe National Forest also appear outside BLM's Principal Study Area in its 2001 RFD. BLM's fundamental error in not studying the geology in its RFD (example following), for parcels now being proposed for leasing in the Santa Fe National Forest, probably continues to plague and corrupt its current EA and FONSI, its RMP, and even its developing Mancos Shale Resource Management Plan Amendment (RMPA) and Environmental Impact Statement (EIS):

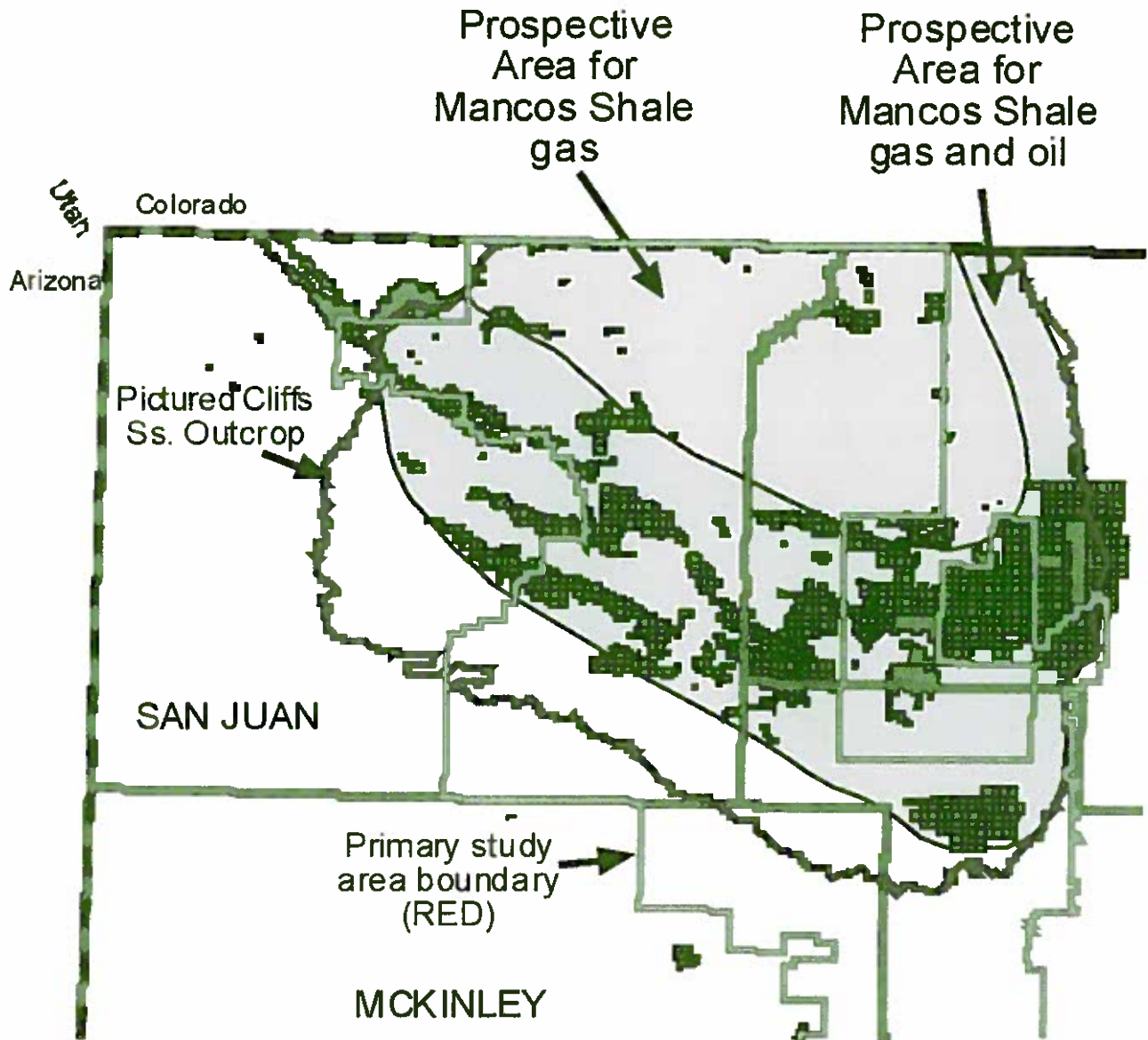


Figure 5.6-2 Map of San Juan Basin showing oil and gas fields that produce from Mancos Shale reservoirs (includes Gallup reservoir). Prospective areas for additional oil and gas development are indicated.

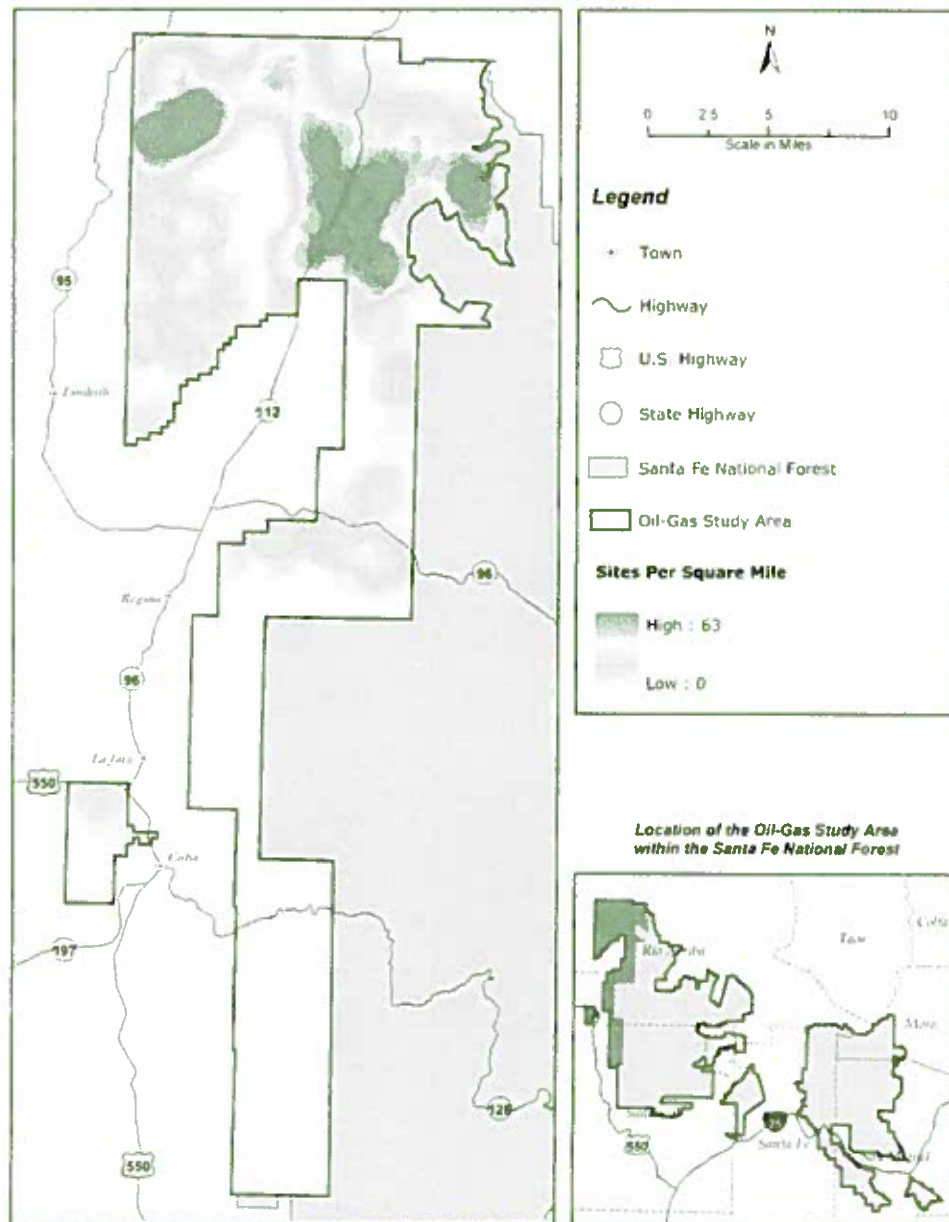
In another example, BLM claims in its EA that even the 1 through 13 remaining parcels proposed for fracking east of the Continental Divide (parcels 2 and 3 on private land reportedly being deferred), that "All of the nominated parcels are located in the San Juan declared ground water basin". This may be the "San Juan's" declared basin, but the "Office of the State Engineer" appears to have other ideas, since the "OSE" is in charge of drinking waters supplies and water well permits, and the "OSE" seems to clearly place the western boundary of the "State of New Mexico Declared Boundaries" for the Chama Platform Watersheds at the CONTINENTAL DIVIDE. BLM also claims the NMED data indicates "there are no drinking water sources located in or near the proposed parcels."

**"According to NMED data, there are no drinking water sources located in or near the proposed parcels. Wells registered with the NM Office of the State Engineer (OSE) are located in and near parcel -171, but these wells appear to be associated with coal exploration. A domestic water well registered with NMOSE is located between parcels -167 and -156. A few other wells located in or near the nominated parcels are described as being used either for livestock, wildlife, or oil and gas use. All of the nominated parcels are located in the San Juan declared ground water basin."**--p. 11 of the EA and the \*.pdf containing same.

"Additional information on water resources in the Forest Service Parcels is contained in the FEIS for Oil and Gas Leasing and Roads Management, Santa Fe National Forest 2008 (page 76-84)."

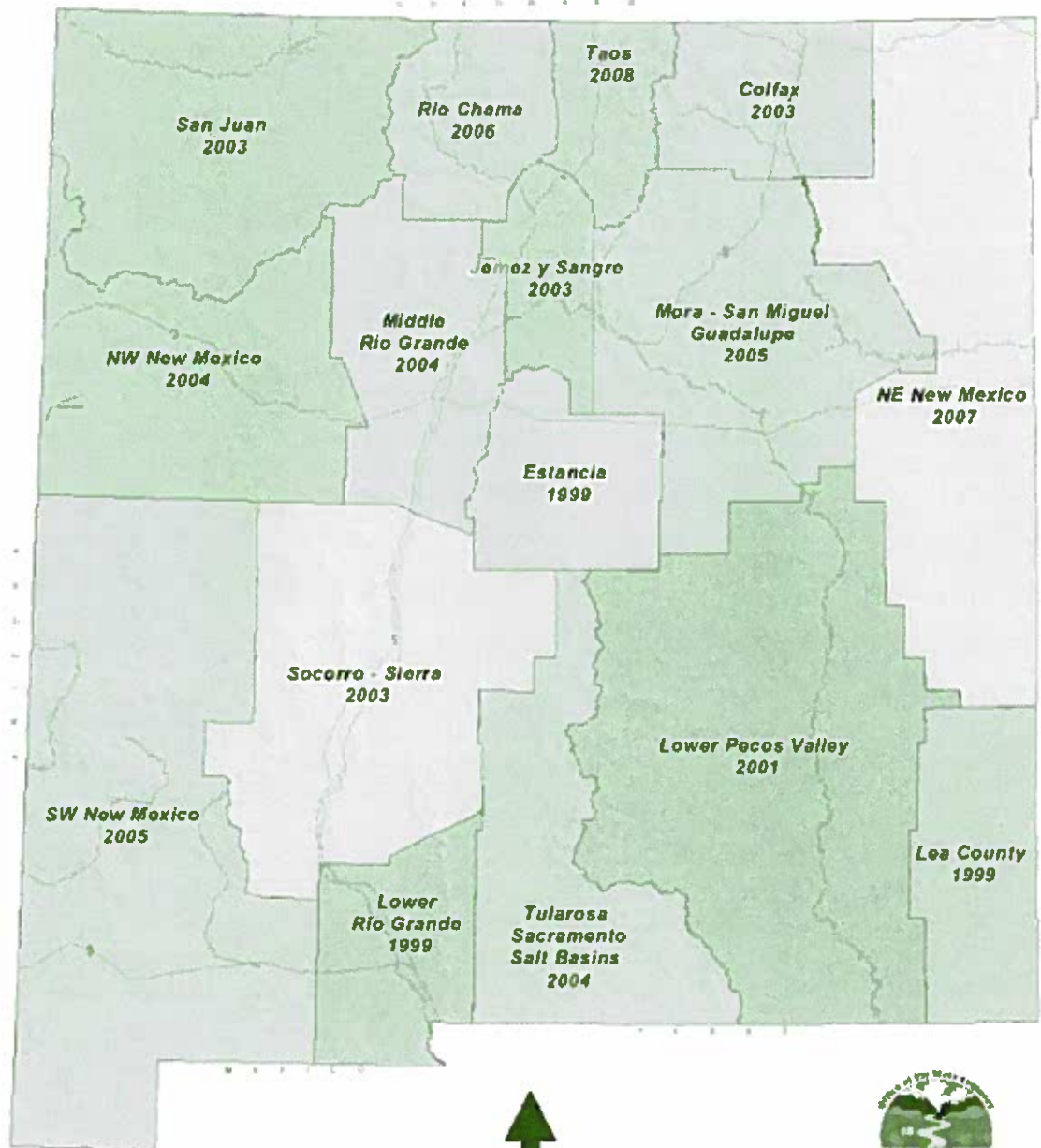
On this same page of its EA, BLM references the FEIS for Oil and Gas Leasing and Road Management document (p. 76-84), but BLM fails to mention that on page 161 (\*.PDF p.165) of this same document referenced, and in the same vicinity of the very lease parcels being proposed in the Santa Fe National Forest (T25NR01E and T25NR01E), there are illustrated heavy densities of artifacts from past civilizations in the Rio Gallina watershed. Either these civilizations thrived with abundant local drinking water that was perhaps often just below the surface in the alluvium of the Rio Gallina Watershed, or they traveled elsewhere (without cars, tanker trucks, or paved roads) to obtain their drinking water and bring water back. They also could have traveled from elsewhere to deposit all their cultural artifacts in the Rio Gallina Watershed (again without cars, trucks, or even paved roads). However, proximal middens are far more common in these older civilizations than distant landfills in our industrialized/planned obsolescence/disposable and toxic societies. Ancient acequias might have transported water long distances to this allegedly dry habitat, but a more likely explanation is that the environment was cleaner, then, in the Gallina watershed, say long before oil and gas exploration and development therein, and one could probably drink the water of the river or obtain it from shallow wells hand-dug into the alluvium. Groundwater contamination from oil production activity in the Rio Gallina watershed has been reported at 14', and seasonal water wells in surface Mancos Shale can range from about 20' to 40' in depth. Shallow uncased, poorly cased, and timber-cased, hand-dug water wells present major problems for shallow oil and gas exploration and development, including fracking the surface Mancos Shale.

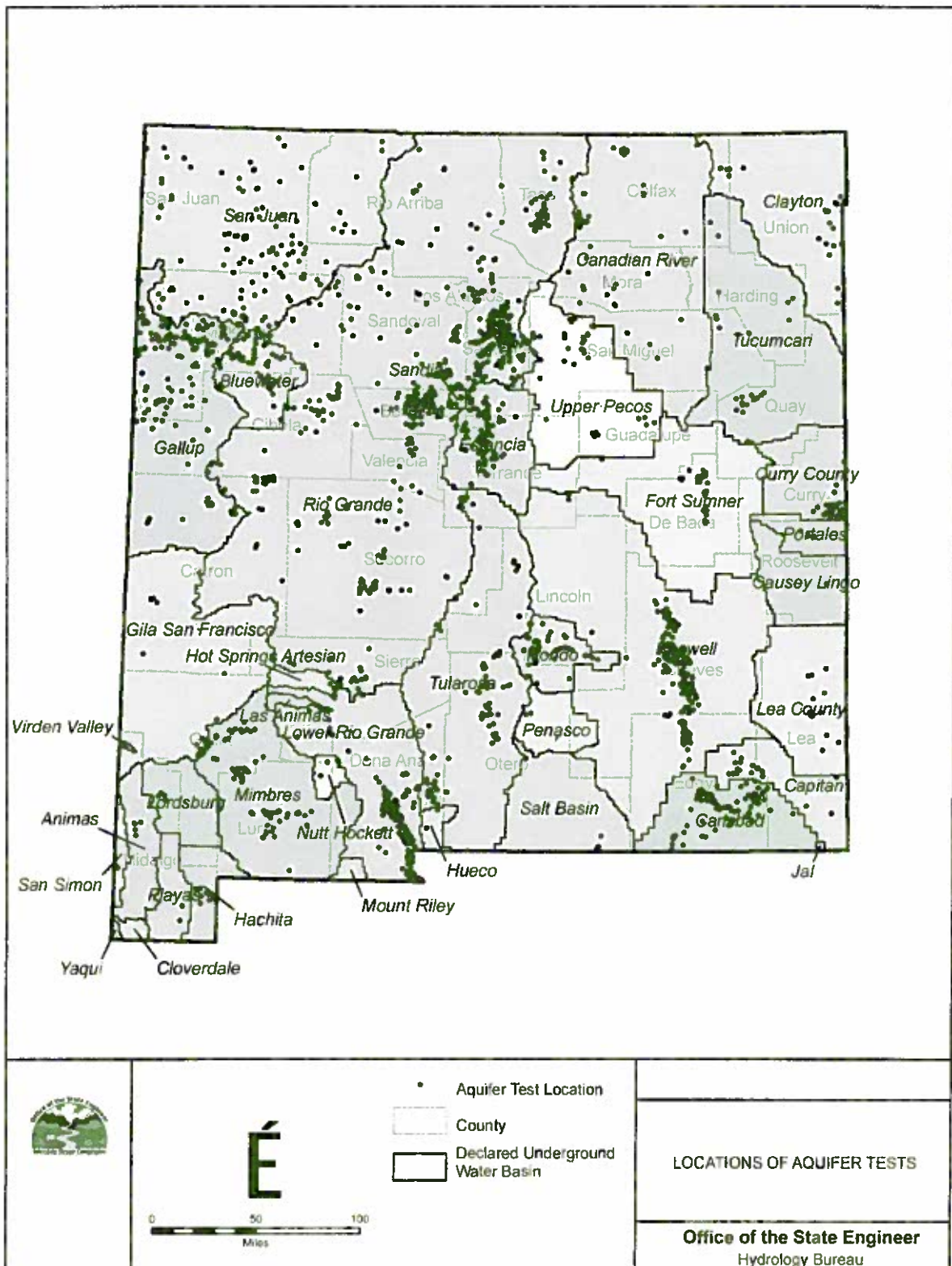




**Figure OG-34. Density of recorded archeological sites within the study area**

## New Mexico Interstate Stream Commission Water Planning Regions







## C U L D A P C





Note that in the previous three figures, and especially the last, the Office of the State Engineer appears to have "declared" the Rio Chama Platform Watersheds to be distinct from the San Juan Basin, with the Continental Divide consistently separating the two "OSE-declared groundwater basins". Thus, according to the Office of the State Engineer, parcels 1 through 13 of BLM's current EA and lease proposal DO **NOT** APPEAR TO BE in the OSE-Declared San Juan Groundwater Basins. Proposed lease parcels, 1 through 13, therefore appear to be in the Rio Chama Watersheds east of the Continental Divide, at least according to the OSE.

Water is always a troubling issue in arid lands. BLM reportedly has some jurisdiction and responsibility in the National Forest for groundwater, but the National Forest apparently has surface water jurisdiction and responsibility. When the Rio Gallina flows with strong surface runoff, does the National Forest have jurisdiction and responsibility, and during drought when the river disappears into the alluvium and runs just below the surface, does the BLM have jurisdiction and responsibility for the Rio Gallina's Water? Since hydraulic fracking uses up to 13,000,000 gallons per well, would it make more sense to have jurisdiction and responsibility the other way around? Shouldn't the National Forest have groundwater rights during a drought to put out forest wildfires, such as perhaps caused by BLM's water-consumptive fracking and flaring in the forest? If the Santa Fe National Forest thinks roads in the Forest contribute to erosion and particulate sediment in water supplies, as indicated in its oil and gas leasing, exploration and development plans, look at what heavy rain after a forest wildfire does! Santa Fe recently had to close its municipal intakes from the Rio Grande when heavy rains after forest wildfires caused flooding just north of Espanola. What if BLM's leases to oil and gas exploration and development result in fracking contamination of groundwater that flows out of surface springs? Who is responsible, then? From whence do we replace that drinking water contaminated with toxic, carcinogenic, and radioactive chemicals in fracking's flowback, produced water, and the 25, 50, or even 85% of fracking fluids that may not be recoverable from fracking that is subsequently left underground to contaminate groundwater-bearing strata? Having the OSE, USEPA, and our elected officials protect the availability and quality of our drinking and irrigation water is far more significant and important than fracking that last drop of oil or whiff of gas from marginally-productive fields. At current prices the renewable clean water resource is far more valuable than non-renewable oil or gas.

A slide show providing additional evidence and countering many of these and other allegations by BLM is provided at the end of this protest and is incorporated, herein, as reasons why any remaining lease proposals in Rio Arriba and Sandoval Counties east of the Continental Divide should be abandoned. There are 38 slides in the first slide show with several notes identifying the significance of the information provided in each. This slide show is available in color at the following web address:

<http://www.vitaletherapeutics.org/Health/Fracking.pdf>

<http://www.vitaletherapeutics.org/Health/Fracking.html>

The second slide show, starting with a startling figure taken from the Ceres Organization's web site (<http://http.ceres.org>), illustrates the striking differences between high water stress and use in the San Juan Basin, and the low water stress and use in the water-drop-shaped Rios Chama, Puerco (de Chama), and Gallina Watersheds east of the Continental

Divide. Note that this information showing low water usage in the Watersheds east of the Continental Divide is confirmed by the Office of the State Engineer, since an estimated that 90 percent of the surface water flows downstream from the Chama Platform Watersheds.

<http://www.vitaletherapeutics.org/FrackingFluids/Chemicals.pdf>

<http://www.vitaletherapeutics.org/FrackingFluids/Chemicals.html>

As early as 1954, the State Engineer, John R. Erickson, authored a study of groundwater flow between a sink hole in the Madera Limestone and a spring in its vicinity. Although names and contours are adjusted in modern geological maps of this area, infra, it is clear the Chinle (TRc) and Cutler (Pct) Formations, and Madera Limestone (IPm) are outcropped far more extensively in the Rio Puerco de Chama and Rio Chama watersheds than in the San Juan Basin.

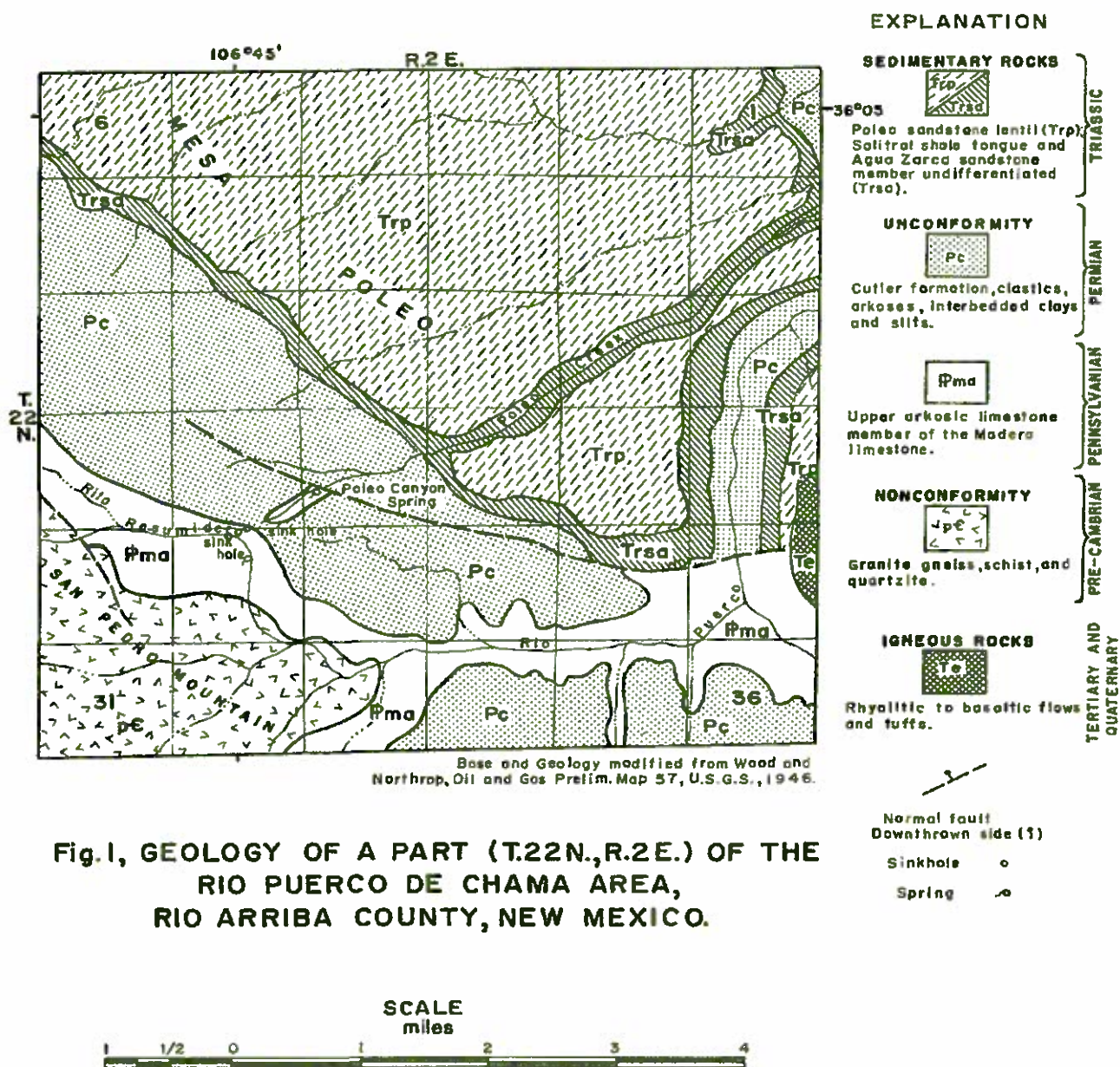


Fig.1, GEOLOGY OF A PART (T.22N.,R.2E.) OF THE RIO PUERCO DE CHAMA AREA, RIO ARRIBA COUNTY, NEW MEXICO.







## THE CHAMA PLATFORM

This remarkable compilation of information in a map, supra, shows fault lines in black, and outcroppings of the deep Madera Limestone (IPm), with the Cutler (Pct) and then the Chinle Formations (TRc) on top of that. Next the Jurassic (J), Morrison Formation (Jm) and Dakota Sandstone (Kd) round out the layering of the drinking-water-bearing strata that often provides water year round in the Chama Platform Watersheds. The filtering Greenhorn Limestone (Kgh) and then the seasonal-water-bearing Mancos Shale (Km) on the surface constitute the filtering system that recharges the year-round water resources below. Note that a major fault line runs directly under the parcels being offered in Sandoval County east of Regina on Highway 96 and then extends northeastwards along Highway 112. Exposed Madera Limestone, Cutler and Chinle Formations in the Watersheds extend westerly from above Abiquiu Lake right up to, and even under this fault line. This fault line is remarkable since it essentially extends from a few miles below El Vado Lake all the way to Bernalillo County. Although some may argue that the Rio Gallina does not run directly over this major fault, this is not true. Not only is there recharging Mancos Shale on the surface, but outcroppings of the Dakota Sandstone, Jurassic, Chinle, and Cutler Formations are also quite evident along this fault. With so many water-bearing, recharging, and filtering strata and formations exposed along this fault line, it is difficult to imagine how ANY spill in the Rio Gallina watershed could be prevented from contaminating this incredible water recharge and filtering system.

Towards the end of the second slide, infra, there are several diagrams from the USEPA's Progress Report on their study of risks associated with hydraulic fracturing in shale presents to our drinking water supplies. Vertical faults increase the risks dramatically since they tend to spread contamination between water-bearing formations through fractured and faulted confining strata. Thus, concerns expressed in these diagrams illustrated by migrations of fracking fluids and produced water vertically along poorly cemented or earthquake damaged casings, and along fault lines are epitomized by these faults in the proposed lease sales in the Rios Gallina and Puerco watersheds. As these waters flow, from southeast of Regina, north and easterly toward Llaves they spread whatever toxic burdens they carry along into the "highly" faulted and fractured strata of the Nacimiento uplift. In fact, when the Rio Gallina turns easterly, just northeast of Llaves, the Rio Gallina runs directly across the major fault and exposed water-bearing strata to join the Rio Chama in filling Lake Abiquiu to the east. Various geological survey articles even report upturns in the formations approaching near vertical, explaining how so many deep formations could be so obviously exposed on the surface just a few miles east of Highway 112 and still retain their deep positions to the east, albeit exposed just above Abiquiu Lake. Such exposures just west of Abiquiu Lake are explained best by the same glacial stripping, crushing, and flushing that removed most of the oil- and gas-bearing strata, once in the Chama Platform and its Watersheds, right down to the surface Mancos Shale now covering most of the surface area of the Watersheds. The targeted strata for oil and gas still found in the San Juan "Basin" to the West of the Continental Divide obviously didn't undergo much of this process, since the "Basin's" southeasterly to northwesterly limited drainage and diminished glacial motion when its northwestern outlet froze. In contrast, the Chama Platform glacial flume emptied to the southeast to flow far more freely with glacial crush and melt flush.

## **BLM's LIST OF FRACKING CHEMICALS DIFFERS DRAMATICALLY FROM EPA's**

The EPA's full report is due to come out in late 2014. The slide show at the end of this protest contrasts the overly simplistic discussion by the BLM of 10 chemicals used in fracking fluids in its EA with the hundreds and perhaps even thousands that the EPA is determining are actually used. Acids, of course, dissolve limestone barriers and filtering strata, especially when forcibly injected, and polyacrylamide is far more insidious, health-wise, than the BLM would have us believe. The EPA identifies acrylamides as being neurotoxins and carcinogens. I worked with polyacrylamide gel electrophoresis to size and separate proteins, including strategically using the polymerizing catalysts to vary the filtering capabilities of the gels so produced. Even while still in college, polyacrylamide gels were recognized as being neurotoxins that required extremely safe handling protocols including protective gloves. It does not belong in our irrigation- and drinking-water supplies and I challenge and refute the safety of the polyacrylamides alleged by the BLM in its EA.

## **SAN JUAN BASIN AND RIO CHAMA PLATFORM DIFFERENCES IGNORED**

BLM's 2001 RFD addresses mostly oil, gas and water resources that have been heavily exploited in the San Juan Basin. The Santa Fe National Forest is illustrated in figures, therein, as being outside BLM's Primary Study Area. BLM's attempts to extrapolate from the San Juan Basin to the Chama Platform, but this fails due to differing geology and hydrology.

**"Development History.** Historically, about 70 wells have been drilled in the Santa Fe National Forest, not including wells that were plugged and abandoned prior to creation of the database maintained by the NMOCD. Thus, the actual number of wells that may have been drilled within the oil-gas study area may be higher than 70 (USFS 2003b). About 78 percent of the wells were drilled to pools associated with the Mancos Formation. These wells produce oil, gas, and small amounts of water. About 22 percent of the wells were drilled to pools associated with the Pictured Cliffs. These wells primarily produce gas with a small amount of associated water and no liquid hydrocarbons. One wildcat (exploratory) well in the oil-gas study area produces from the Greenhorn Limestone Member of the Mancos Shale. One well was completed to the Gavilan Nacimiento Pool and subsequently plugged. Gas injection is used to maintain subsurface pressures in the eastern part of the West Puerto Chiquito Mancos pool." --p.50 Final Environmental Impact Statement for Oil-Gas Leasing and Roads Management, SFNF *Oil-Gas Leasing* Chapter 3. Affected Environment and Environmental Consequences

The Office of the State Engineer has records for 446 for all wells East of the Continental Divide in Rio Arriba County in Township Ranges 1W and 1E. On the one hand, the Santa Fe National Forest seems to be under-reporting the number of wells and the Farmington Field Office appears to be over-exaggerating. The truth probably lies somewhere in between.

The first slide show has a compilation of wells by Township and Range where BLM's proposed lease parcels are located, from which the percentage of productive wells necessary for profitability can be estimate. The estimated break point for profitability is about 30%, whereas the percentage of productive wells in some of the Township Ranges where proposed lease parcels are located range from a low of 11% to almost 19%. This field appears to limited even further as one goes farther north, east, and south, making it obvious that the majority of oil and gas "prospects" lie further west, say of the Continental Divide.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

SUBMIT IN TRIPPLICATE\*  
(Other instructions on reverse side)

Form approved.  
Budget Bureau No. 42-R1424

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

1. WELL OIL WELL <input checked="" type="checkbox"/> GAS WELL <input type="checkbox"/> OTHER <input type="checkbox"/>		5. LEASE DESIGNATION AND SERIAL NO. <b>NM 041</b>
2. NAME OF OPERATOR <b>HENSON-MONTIN-GREEK DRILLING CORP.</b>		6. IF INDIAN, ALLEGATE OR TRIBE NAME
3. ADDRESS OF OPERATOR <b>158 Petroleum Center Building, Farmington, New Mexico</b>		7. UNIT AGREEMENT NAME
4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements. See also space 17 below.) At surface <b>2400' FNL, 1990' FNL, Sec. 6, T-26N, R-1E</b>		8. FARM OR LEASE NAME <b>Puerto Chiquito</b>
14. PERMIT NO.		9. WELL NO. <b>6-6</b>
15. ELEVATION (Show whether DT, RT, CR, etc.) <b>7319' RKB</b>		10. FIELD AND POOL, OR WILDCAT <b>Puerto Chiquito</b>
		11. SEC., T., R., M., OR B.L. AND SURVEY OR AREA <b>Sec. 6, T-26N, R-1E</b>
		12. COUNTY OR PARISH <b>Rio Arriba</b>
		13. STATE <b>New Mexico</b>

16. Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF <input type="checkbox"/>	DEEL OR ALTER CASING <input type="checkbox"/>	WATER SHUT-OFF <input type="checkbox"/>	REPAIRING WELL <input type="checkbox"/>
FRACTURE TREAT <input type="checkbox"/>	MULTIPLE COMPLETE <input type="checkbox"/>	FRACTURE TREATMENT <input type="checkbox"/>	ALTERING CASING <input type="checkbox"/>
SHOOT OR ACIDIZE <input type="checkbox"/>	ABANDON* <input type="checkbox"/>	SHOOTING OR ACIDIZING <input type="checkbox"/>	ABANDONMENT* <input type="checkbox"/>
REPAIR WELL <input type="checkbox"/>	CHANGE PLANS <input type="checkbox"/>	(Other) <input checked="" type="checkbox"/> <b>Present Status</b>	
(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)			

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting and proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

1- 7-64 TD 3642'. 4-hour bailing test recovered 1½ gallons water.

1- 9-64 TD 3804'. Slight show of gas and rainbow of oil.  
TD 3808'. Picked up water. Started bailing.

1-10-64 Bailed total of 77 barrels water at approximate rate of 100 barrel per bailer. Fluid level 2600'. Shut down. After being shut down 45 minutes, had 150' of fill-up.

1-11-64 Bailing water from 2600'. Bailed approximately 100 barrels in 22 hours.

1-13-64 Plugged back with 10 sacks frac sand to 3768'. Dumped 4 sacks calseal, approximately 90 gallons slurry. No apparent fill-up. Dumped 2 sacks calseal, approximately 18 gallons slurry. No apparent fill-up.

1-14-64 Plugged back to 3748' with calseal. Bailed hole down to 2223'. In 45 minutes had fill-up of 4' of water.

1-16-64 Bailed water down to 3648'.

1-17-64 Bailed hole dry. Filled hole with 157 barrels oil to protect formation.

10-19-64 Shut down waiting on orders.

18. I hereby certify that the foregoing is true and correct

SIGNED Albert R. Gryn TITLE Vice-President DATE 10-19-64

(This space for Federal or State office use)

APPROVED BY \_\_\_\_\_ TITLE \_\_\_\_\_ DATE \_\_\_\_\_

CONDITIONS OF APPROVAL, IF ANY:

\*See Instructions on Reverse Side



## WERE CONCEIVABLY EPA-BANNED CLASS IV WELLS EVEN SCOPED?

The previous figure illustrates an all too common practice. This was one of two waste injection wells that have injected wastes above or into the vicinity of the Greenhorn Limestone and Dakota Sandstone that distinguishes the year-round drinking-water Morrison Formation from the Mancos Shale that is often on the surface. Since the Mancos Shale is a seasonal drinking-water source, 1) drilling into the Morrison, 2) plugging back at least some of the Dakota Sandstone and casing perforations, and 3) dumping 157 barrels of oil, and finally 4) injecting contaminated flowback and produced water, and perhaps even industrial wastes, directly into and above drinking-water producing strata does not appear to be taking the necessary steps to protect the groundwater in the Rio Gallina watershed, nor ultimately the Rios Chama and Grande.

## ARE THERE UNADDRESSED WASTE INJECTION SEISMIC CONCERNS?

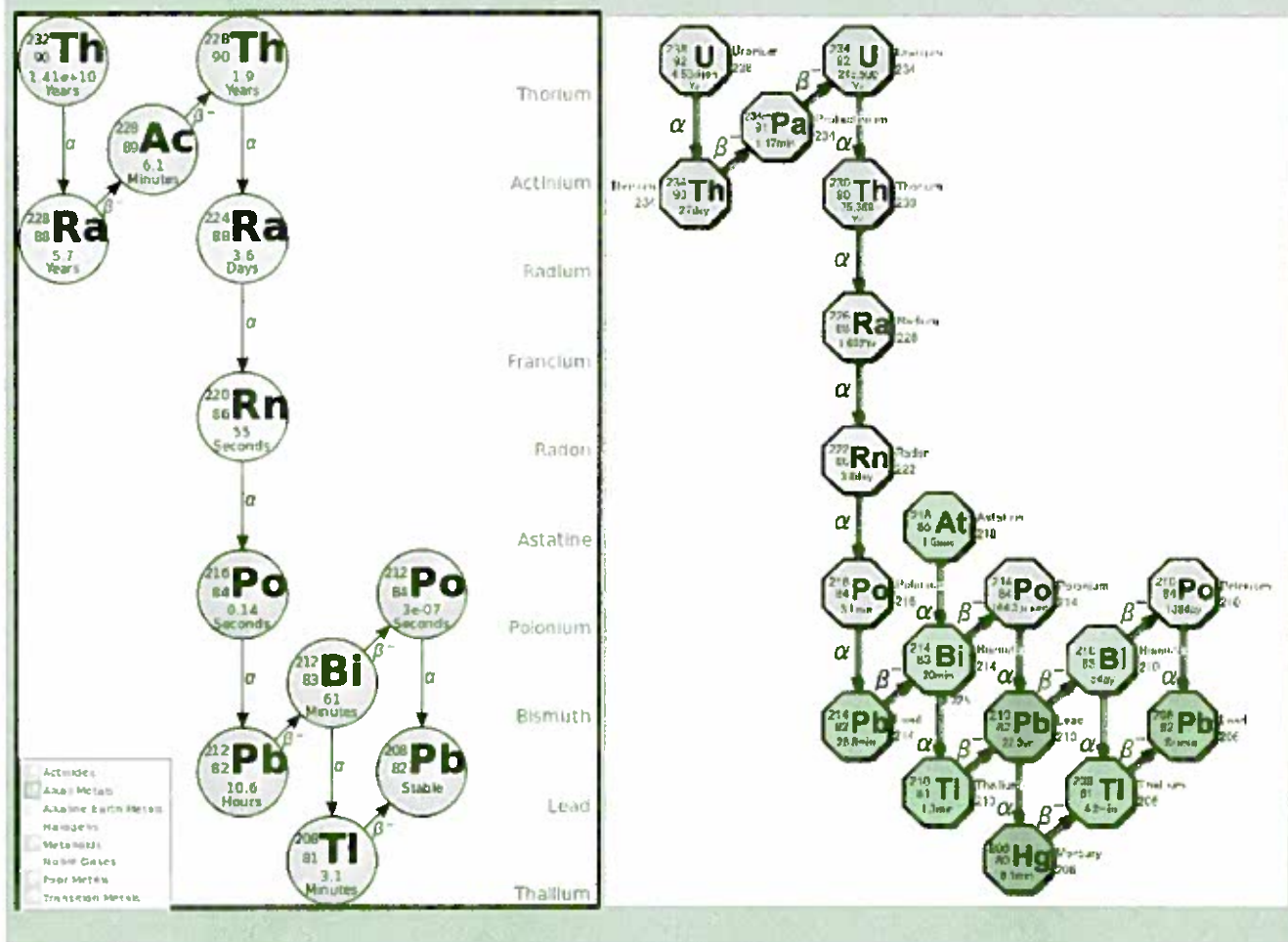
Waste injection into this well reportedly stopped in July of 2010, just 5 months before earthquakes were recorded above Abiquiu Lake in December of 2010, and this well was not plugged until 4/25/2012. This waste injection well appears to be in the same Township Range, T26NR01E as proposed lease parcels in the Santa Fe National Forest.

The first slide show, *infra*, contains information about a swarm of earthquakes occurring around Trinidad Lake, just above the city of Trinidad, Colorado after about 10 wells were injected with wastes, apparently into the very same Dakota Sandstone and Morrison Formation strata interfaces.

## CONTAMINATION, AND EARTHQUAKES, AND RADIATION? OH MY!

The first slide show, *infra*, also provides background substantiating that just drilling into and perforating the casing in the vicinity of the Dakota Sandstone and Morrison Formation can dislodge Uranium from whence it has been sequestered, resistant to leaching from the strata by repeated glacial crushes and flushes after many cycles of fresh water recharge from the Mancos Shale above. This becomes even more problematic if epithermal neutron well logging is used to guide the drilling and fracking operations, since there is a potential for fertile <sup>238</sup>-Uranium to neutron capture and form the more carcinogenic and highly toxic <sup>239</sup>-Plutonium. The decay modes for Uranium, Thorium, Neptunium, Plutonium, Radium, Radon, and a host of other radioisotopes is complicated. When added to our background radiation, both naturally-occurring and man-made, these new exposures put us at greater health risks, well beyond the low levels of exposure, or hormesis, that are sometimes touted as beneficial.

Although many of these radioisotopes are also toxic from a chemical standpoint, especially <sup>239</sup>-Plutonium, and even <sup>238</sup>-Uranium and <sup>232</sup>-Thorium that have been around...for all practical purposes....FOREVER....can be toxic to us when concentrated. The longer-lived radioisotopes tend to be safer at low concentrations because they put out the radiation slower. Unfortunately, our bodies concentrate many radioisotopes once inhaled, ingested, and even through the skin. Both <sup>131</sup>-Iodine and <sup>125</sup>-Iodine are concentrated and kill thyroid tissue. Other radioisotopes in their ionic forms are about the same size as calcium and can concentrate in the bone and kill stem cells that are needed to replenish our blood cells.

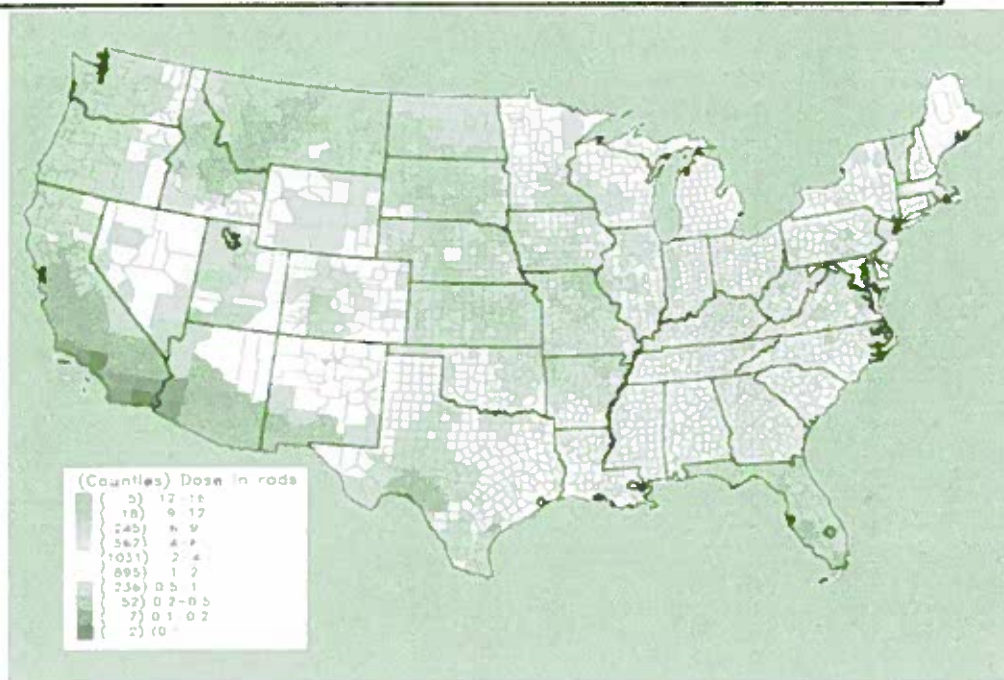
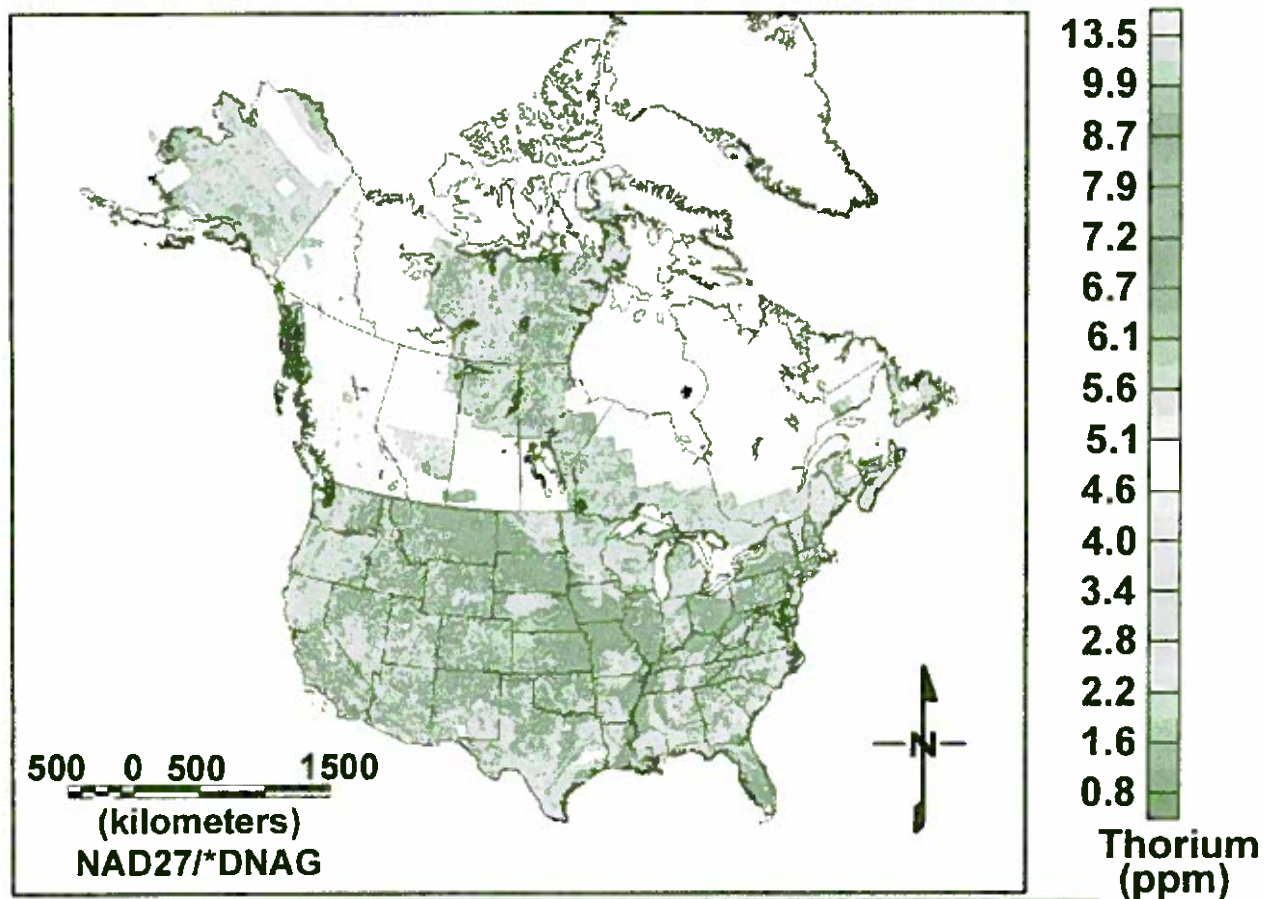


232-Thorium and 238-Uranium are long half-lived radioactive elements that have been around for very long times, but as illustrated in these decay chains, they produce many short-lived radioisotopes that decay quickly and can be more dangerous radioactively at lower concentrations. Thorium and uranium vary in their natural distribution, and Radon is an inert gas produced from natural deposits of Uranium. Upon inhalation Radon accumulating in closed spaces is associated with increased cancer, lungs being an obvious target.

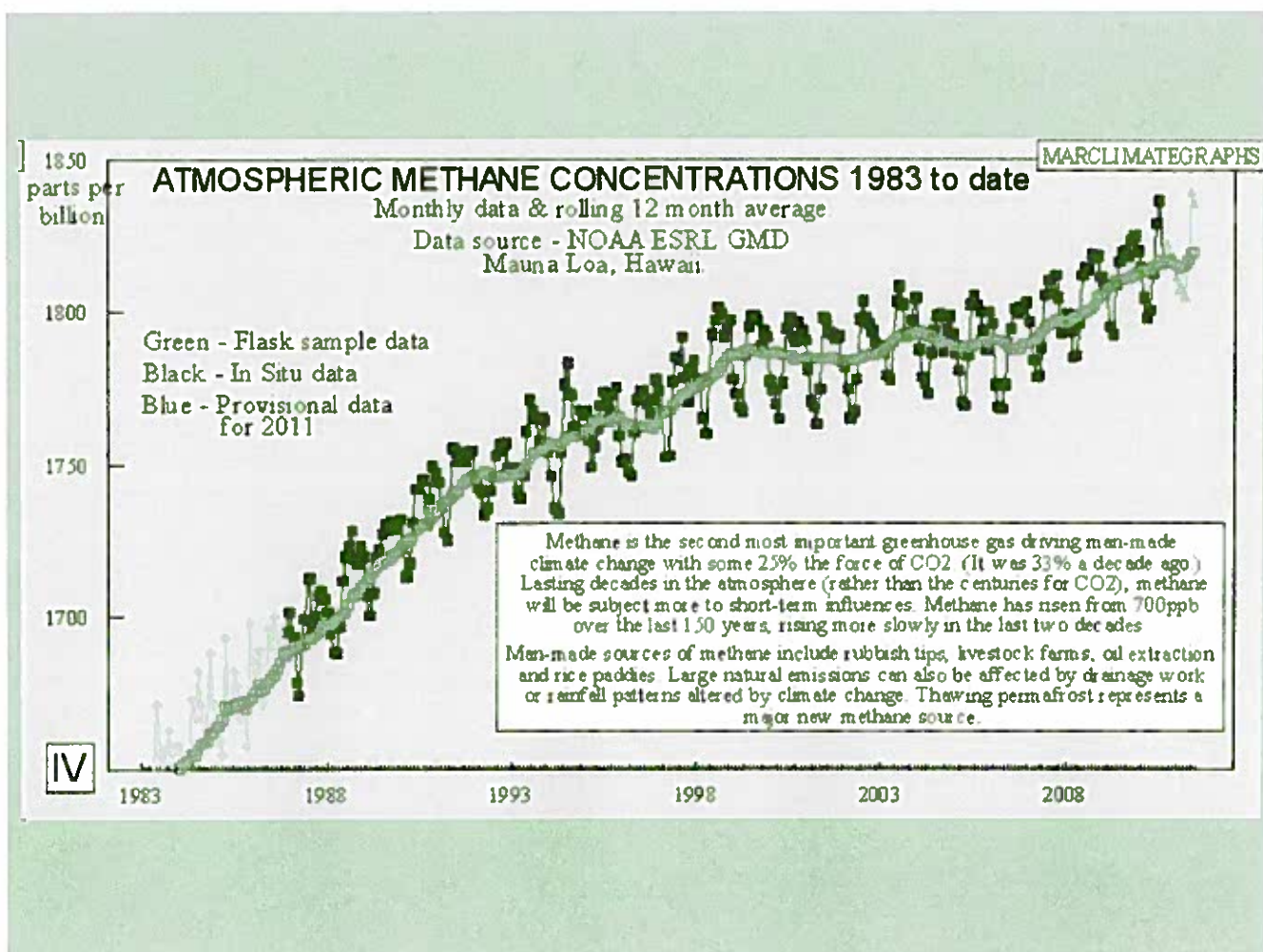
Additional sources of radiation include open atmospheric testing of nuclear weapons, and even fracking with nuclear explosives, as tried southwest of Dulce, NM in Projects Gasbuggy (29 kilotons), Rulison in Grand Valley, Colorado, and Rio Blanco in Rifle, Colorado. The natural gas released in the Gasbuggy "experiment" could not be used in power plants because it was too radioactive, and the entire production was wasted by flaring into the air. The other experiments were similarly unsuccessful for the same radiation contamination reasons.

The United States did a lot of open air testing of nuclear weapons, which essentially blanketed much of the United States with appreciable amounts of radiation. Following are snapshots of the continental distributions for both Thorium and atmospheric weapons testing:

# Thorium Concentrations

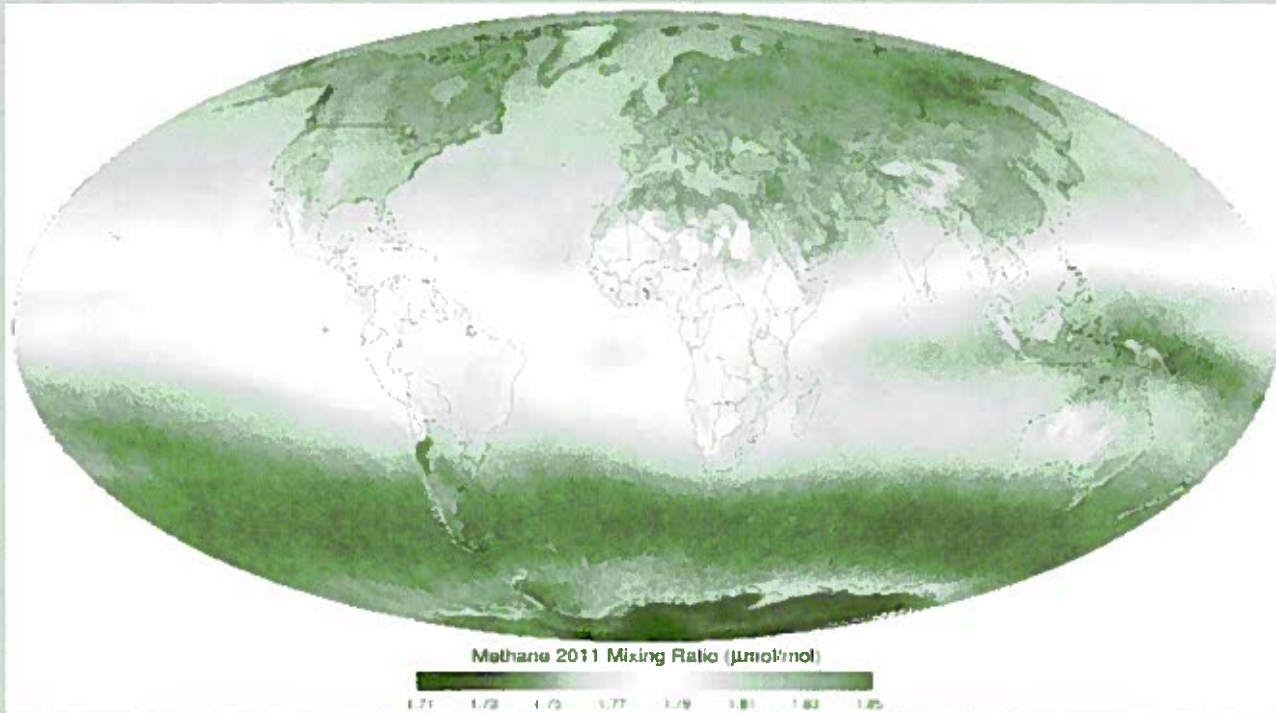






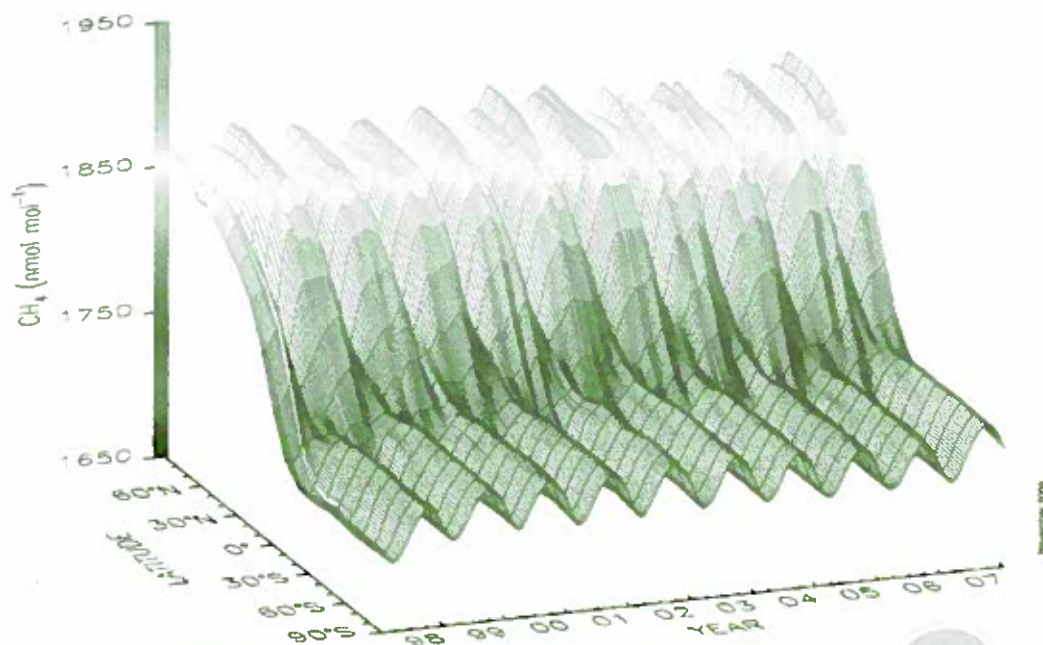
## HYDRAULIC FRACKING METHANE LOSS ESTIMATED AT 7 TIMES REPORTED

With the passing of the Energy Policy Act of 2005 there was an upswing in the atmospheric levels of methane, considered by some to be the harbinger of global warming. Although this seems controversial along party lines, there is another fallout from this law, which essentially released the oil and gas industry from responsible behavior and culpability in spill and accidents. The oil and gas industry do not have to report what is being put into the fracking fluids or into the waste injection wells if certain guidelines are followed. With a boom mentality, domestic oil and gas production took off. Sometimes called the "Halliburton Loophole", much like the "Monsanto Protection Act" corporate America does not seem to think it has to tell us how it is harming us. Following are several figures showing higher atmospheric methane levels in the northern than southern hemisphere. These differences are not affected seasonally, but there is a distinct, smaller seasonal variation in methane levels that seasonally flips from highs in the northern hemisphere to highs in the southern hemisphere, with similar seasonal, out of phase flips for the lows in methane concentration. Seasonal variations are probably indicative of delivery and transport losses, rather than methane release from oil and gas production.



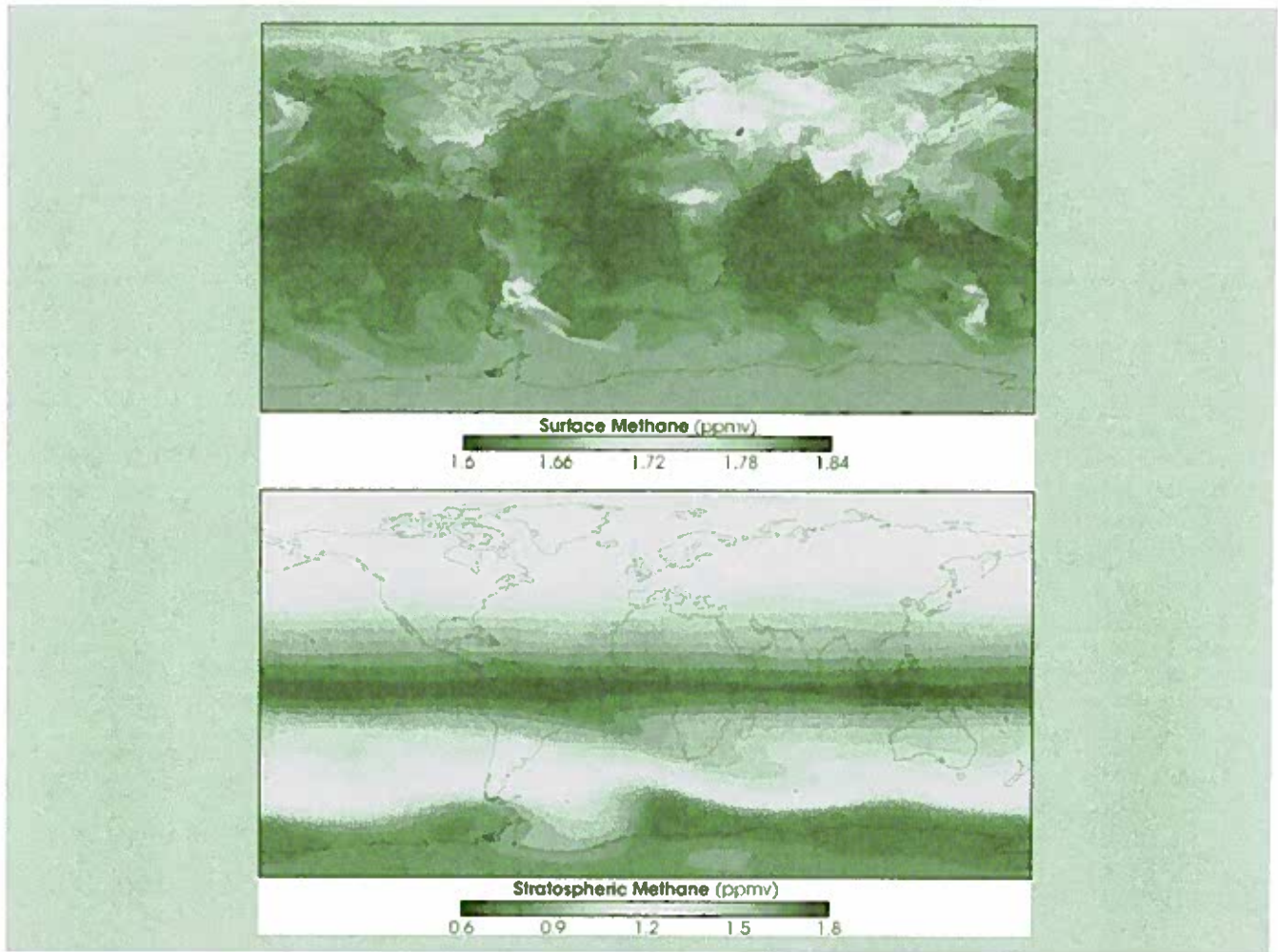
### Global Distribution of Atmospheric Methane

NOAA ESRL Carbon Cycle



Three-dimensional representation of the latitudinal distribution of atmospheric methane in the marine boundary layer. Data from the Carbon Cycle cooperative air sampling network were used. The surface represents data smoothed in time and latitude. Contact: Dr. Ed Dlugokencky, NOAA ESRL Carbon Cycle, Boulder, Colorado (303) 497-6228, ed.dlugokencky@noaa.gov, <http://www.esrl.noaa.gov/gmd/ccgg/>





Methane is not the same concentration at the surface as it is at higher altitudes, and the chemistry of methane's interaction with its environment and solar radiation likewise varies. It is clear that the methane is concentrated at higher altitudes in these figures, which may result from enhanced surface warming in the northern hemisphere, and a more rapid climb of gas.

This evidence is provided in support of Galen D. Knight's protest of BLM's proposed lease of oil and gas exploration and development in the Chama Plateau Watersheds, this 15<sup>th</sup> day of August, 2014 Galen D. Knight